resembling the morning twilight, and was observed between 10.30 p. m. of the 3d and 2 a. m. of the 4th. It was visible only in the northeast, the remainder of the sky being obscured by clouds. At Saint Vincent, Minnesota, auroral beams were visible from 9.30 a. m. until the morning of the 4th.

The most brilliant and widely observed display of the month was that which occurred during the evening of the 24th. Owing to the cloudiness which prevailed in the New England states it was reported by but few stations in that section. At Escanaba, Michigan, it first appeared at 9.30 p. m., as an arch of pale yellow light changing rapidly to a bright yellowish green with beams extending toward the zenith. This display was especially noted for the southerly latitudes in which it was observed. It was seen at Nashville, Tennessee, at 7.50 p. m., as an arc of whitish light tinged with light blue which extending over 40° of the northern horizon and to an altitude of 9°. Several beams were observed between 8.15 and 8.25 p. m.

At Chapel Hill, North Carolina, it was observed as a faint display from 8 to 9 p. m.

At Variety Mills, Virginia, the aurora was brilliant from 8.20 to 9 p. m., extending from north-northeast to north-northwest, with streamers reaching an altitude of from 18° to 20°. This display was also seen at Washington, District of Columbia, from 7.45 to 9 p. m. The most westerly stations reporting this aurora were Forts Assinniboine and Benton, Montana. At Fort Assinniboine, it was visible from 9.30 to 11 p. m., with bright streamers reaching an altitude of 45°. At Fort Benton, it was reported as a faint display from 8 to 11 p. m.

Displays of less extent and brilliancy were reported as follows:

1st.—At Kiantone, New York, and Bristol, New Hampshire.

2d.—Newport, Vermont.

4th.—Saint Vincent, Minnesota; Wicklow, Dakota, and at numerous stations in New England and Canada.

5th.—Escanaba, Michigan; Saint Vincent, Minnesota; Manitowoc, Wisconsin.

6th.—Duluth, Minnesota; Murfreesborough, Tennessee. On this date the s. s. "Circassian," in N. 51° 30′, W. 30° 00′, saw northern lights showing brightly.

7th.—Franklin, Wisconsin; Escanaba, Michigan; Charlottetown, Prince Edward Island.

9th.—Kiantone, New York.

10th.—Sidney, Nova Scotia; Fredericton, New Brunswick.

15th.—Rochester, New York.

17th.—Fredericton, New Brunswick.

18th.—Bordentown, New Jersey; Eastport, Maine; Fort Benton, Montana.

19th.—Escanaba and East Tawas, Michigan; Cresco, Iowa.

25th.—Fredericton, New Brunswick; Gardiner and Dexter, Maine; Woodstock, Vermont; Franklin, Pennsylvania; Alpena and Escanaba, Michigan; Fort Assinniboine Montana.

26th.—Fredericton, New Brunswick; Dexter, Maine; Franklin, Wisconsin; Bismarck, Dakota; Saint Vincent, Minnesota.

27th.—Wicklow, Dakota; Toronto, Ontario; Woodstock, Vermont.

28th.—Kiantone, New York.

29th.—Catawissa, Pennsylvania; Ionia, Michigan.

30th.—Charlottetown, Prince Edward Island; Franklin, Wisconsin.

ELECTRICAL PHENOMENA.

Pike's Peak, Colorado, 18th.—All metallic objects were tipped with electric light during the morning.

Yuma, Arizona, 12th and 20th.—The observer experienced severe shocks from contact with the anemometer wires to which no battery was attached.

THUNDER-STORMS.

Thunder-storms were reported in the various districts on the following dates:

New England.—12th, 20th.

Middle Atlantic states.—5th, 6th, 7th, 11th, 12th, 17th to 20th, 22d, 23d, 27th, 28th.

South Atlantic states.—1st, 2d, 5th, 6th, 7th, 9th, 11th, 12th, 15th, 16th, 19th, 22d, 23d, 24th, 26th, 28th, 29th, 30th.

Florida peninsula.—1st, 2d, 10th to 13th, 23d, 24th, 28th, 29th, 30th.

Eastern Gulf.—1st, 3d, 4th, 6th, 7th, 9th, 11th, 12th, 14th, 15th, 19th, 22d, 23d, 27th to 30th.

Western Gulf.—3d to 8th, 10th, 11th, 13th, 14th, 15th, 18th, 19th, 21st, 22d, 23d, 26th to 30th.

Rio Grande valley.—5th, 6th, 26th, 28th, 29th.

Ohio valley and Tennessee.—4th to 7th, 9th to 15th, 19th, 21st, 22d, 23d, 26th, 27th, 28th, 30th.

Lower lakes.—5th, 10th, 11th, 13th, 15th, 16th, 19th, 27th, 28th.

Upper lakes.—4th, 5th, 7th, 10th, 11th, 13th, 14th, 15th, 18th, 22d, 27th.

Extreme northwest.—9th, 10th, 11th, 17th, 20th.

Upper Mississippi valley.—3d to 7th, 9th to 15th, 19th, 21st, 22d, 23d, 27th, 28th.

Missouri valley.—3d, 4th, 5th, 9th to 14th, 18th, 20th, 21st, 22d, 26th, 27th, 29th, 30th.

Northern slope.—7th, 10th, 13th, 20th, 27th to 30th.

Middle slope.—3d, 4th, 5th, 9th, 11th to 14th, 20th, 21st, 22d, 25th, 26th, 27th, 29th, 30th.

Southern slope.—3d, 5th, 7th, 9th, 12th, 21st, 26th, 29th.

Southern plateau.—6th, 26th, 28th, 29th.

Northern plateau.—7th, 19th, 27th, 29th.

Thunder-storms were also reported from the following state and territory not included in the districts named above:—

California.—Fort Bidwell, 26th; San Diego, 3d.

Utah.—Salt Lake City, 4th.

The following instances of damage by lightning during thunder-storms have been reported:

Indianapolis, Indiana, 6th.—The building of the telephone exchange in this city was struck by lightning at 8 a. m. The tower where the wires centered was completely destroyed, entailing a loss of $2,500.

New London, Connecticut, 12th.—During the thunder-storm of this date, several buildings were damaged by lightning.

Dedham, Massachusetts, 20th.—A church at this place was struck by lightning and damaged to the extent of $2,400.

Catawissa, Pennsylvania, 20th.—A large paper-mill was struck by lightning and burned. Over one hundred cords of wood were destroyed. The loss in this vicinity is estimated at more than $125,000.

OPTICAL PHENOMENA.

SOLAR HALOS.

Solar halos have been observed in the various districts on the following dates:

New England.—1st, 2d, 10th, 12th, 14th, 17th, 19th, 21st, 26th, 29th.

Middle Atlantic states.—2d, 3d, 5th, 6th, 7th, 9th, 13th, 18th, 19th, 22d, 26th, 27th, 30th.

South Atlantic states.—3d, 4th, 6th, 7th, 9th, 12th to 15th, 19th, 22d, 24th.

Western Gulf.—3d, 5th, 12th, 17th, 18th, 22d, 23d, 25th, 29th.

Ohio Valley and Tennessee.—3d, 4th, 6th, 8th to 14th, 17th, 18th, 19th, 21st, 22d, 24th, 26th, 27th, 28th.

Lower lakes.—1st, 2d, 3d, 13th, 17th, 18th, 21st, 23d, 25th, 26th.

Upper lakes.—1st, 7th, 8th, 11th, 12th, 13th, 17th, 18th, 20th, 23d to 26th.

Extreme northwest.—3d, 10th, 19th, 20th, 24th.

Upper Mississippi valley.—1st, 2d, 4th, 6th, 9th, 11th, 12th, 13th, 17th to 26th, 28th, 29th, 30th.

Missouri valley.—3d, 6th, 16th to 19th, 24th, 29th.

Middle Pacific.—2d, 3d, 7th, 9th, 10th, 11th, 13th to 16th, 18th, 20th, 27th, 28th 29th.

South Pacific.—1st, 2d, 6th, 7th, 15th to 18th, 22d, 27th, 28th.

Solar halos were also observed in following states and territories not included in the districts named above:

Arizona.—Prescott, 10th, 16th, 17th, 28th.
Colorado.—Colorado Springs, 23d.
Florida.—Key West, 25th; Pensacola, 26th, 29th.
Idaho.—Lewiston, 4th, 5th, 6th, 14th.
Kansas.—Yates Centre, 1st, 10th, 11th, 12th, 17th, 26th.
Mississippi.—Vicksburg, 2d, 3d, 17th, 18th, 26th, 30th.
Montana.—Fort Keogh, 19th; Terry's Landing, 19th, 20th.
Nevada.—Carson City, 25th.
Oregon.—Albany, 6th, 17th, 27th; Roseburg, 17th, 28th.
Texas.—Fort Davis, 16th; Rio Grande City, 19th.
Utah.—Salt Lake City, 16th, 18th, 28th.

Mr. B. B. Cutler, of Heath, Massachusetts, reports having observed a solar halo of very unusual character at that place on April 26th.

LUNAR HALOS.

Lunar halos have been observed in the various districts on the following dates:

New England—13th, 14th, 17th to 20th, 26th.
Middle Atlantic states.—11th, 13th, 15th, 17th, 18th, 19th, 21st.
South Atlantic states.—6th, 11th, 14th, 15th, 18th, 19th, 21st, 23d.
Eastern Gulf.—12th, 14th, 17th, 18th.
Western Gulf.—13th, 14th, 16th, 17th, 22d, 23d, 24th.
Rio Grande valley.—14th, 15th, 16th.
Ohio valley and Tennessee.—12th, 14th, 17th to 20th.
Lower lakes.—11th to 15th, 18th to 21st, 25th, 26th.
Upper lakes.—2d, 10th, 11th, 12th, 14th, 16th to 20th, 22d, 23d, 24th.
Extreme northwest.—11th, 12th, 15th, 18th, 19th, 20th.
Upper Mississippi valley.—11th, 12th, 17th to 20th, 23d, 24th, 25th, 30th.
Missouri valley.—10th to 14th, 16th to 20th.
Northern slope.—12th, 13th, 16th to 19th, 22d.
Middle slope.—4th, 10th, 16th, 17th, 18th, 20th, 22d, 23d, 27th.
Southern plateau.—15th, 17th, 18th.
Northern plateau.—18th, 19th, 23d.
Middle Pacific.—10th 13th to 16th, 18th, 28th.
South Pacific.—8th, 14th, 15th, 17th, 23d.

Lunar halos were also observed in the following states and territories not included in the districts named above:

Florida.—Limona, 21st.
Nevada.—Carson City, 18th.
Oregon.—Albany, 20th; Portland, 18th.
Texas.—Fort Concho, 16th.
Utah.—Salt Lake City, 15th, 16th.

Mr. John H. Gibson, of Salina, Kansas, has forwarded an illustration of a very complete lunar halo, as observed by him at 7.30 p. m. of April 10th. He reports in connection with it: moon, three days old; temperature, 42°; barometer, (aneroid,) 28.50; wind, nw. and velocity two miles. The illustration shows the halo to have been of the class represented in Figure 85, page 216 of "Loomis' Treatise on Meteorology."

MIRAGE.

Wicklow, Dakota, 3d.—The village of Madison was plainly visible, which is ten miles distant and is hidden from view by the swell in the prairie. On the 9th, the country in the southwest beyond the horizon was plainly visible. Mirage similar to that observed on the 3d, was also seen on the 16th.

Duluth, Minnesota, 20th.—At 5.00 p. m., a fine mirage was observed, about eighteen miles distant on the southern shore of the lake. Three well-defined lakes, surrounded by and filled with islands, were distinctly seen through the telescope.

Mirage was also observed at the following stations:

Alexandria, Dakota, 6th, 7th, 19th, 26th.
West Bend, Iowa, 16th.
Northport, Michigan, 12th.
Traverse City, Michigan, 20th.
Pretty Prairie, Kan, 2d, 6th.
Indianola, Texas, 1st, 23d.

MISCELLANEOUS PHENOMENA.

SUNSETS.

The characteristics of the sky as indicative of fair or foul weather for the succeeding twenty-four hours, have been observed at all Signal Service stations. Reports from one hundred and seventy-three stations show 5,156 observations to have been made, of which twelve were reported doubtful; of the remainder, 5,144, there were 4,331, or 84.2 per cent., followed by the expected weather.

SUN SPOTS.

The following record of sun spots for the month of April, 1883, has been forwarded by Mr. D. P. Todd, Director of the Lawrence Observatory, Amherst, Massachusetts:—

DATE—April, 1883.	No. of new		Disappear'd by solar rotation.		Reappear'd by solar rotation.		Total No. visible.		REMARKS.
	Gr'ps	Spots	Gr'ps	Spots	Gr'ps	Spots	Gr'ps	Spots	
1, 8a. m...	2	5	1	5	0	0	4	20‡	One of spots very large.
3, 8 a. m...	1	5	0	0	0	0	5	25‡	Do.
4, 9 a. m...	1	3	0	0	0	0	6	30‡	Do.
5, 8 a. m...	1	5	0	0	0	0	7	35‡	Do.
7, 5 p. m...	1	5	2	5	0	0	5	30‡	
8, 9a. m...	0	0	0	0	0	0	5	30‡	
8, 2 p. m...	0	0	0	0	0	0	5	30‡	
10, 6 p. m...	0	0	1	5	0	0	4	20‡	
12, 10a. m...	2	15‡	1	2	2	15‡	4	35‡	
13, 11 a. m...	1	5	0	0	1	5	5	40‡	
14, 12 m....	0	20‡	1	2	0	5	4	60‡	Many spots quite small.
15, 11 a. m...	1	5	0	0	0	0	5	65‡	Do.
15, 3 p m...	1	5	0	0	0	0	6	70‡	Do.
18, 8a. m...	0	0	1	2	0	0	5	65‡	Do.
19, 8a. m...	0	5	0	5	0	0	5	65‡	Do.
19, 11 a. m...	0	0	0	0	0	0	5	65‡	Do.
20, 5 p. m..	0	0	1	10‡	0	0	4	55‡	Do.
21, 10 a. m...	1	2	0	0	1	2	5	55‡	Do.
25, 12 m....	3	15‡	.....	.....	.....	.....	5	20‡	
26, 3 p. m...	0	0	0	0	0	0	5	20‡	
27, 3 p. m...	1	1	0	0	1	1	6	15‡	
28, 8 a. m...	0	0	0	0	0	0	6	12	
29, 5 p. m...	0	0	2	3	0	0	4	10	
30, 11 a. m...	0	0	0	0	0	0	3	8	

‡Approximated. Faculæ were seen at the time of every observation.

Mr. H. D. Gowey, at North Lewisburg, Ohio, reports that sun spots were observed on all clear days during the month. They were most numerous on the 16th; least numerous on the 26th; largest on the 3d, and smallest on the 24th.

Lieutenant W. H. Smith, R. N. R., commanding the s. s "Circassian," reports having observed sun spots between N. 42° 10′, W. 52° 15′, and N. 55° 02′, W. 5° 41′, from April 2d to 9th, as follows: 2d, one spot; 3d, one spot; 8th, two spots; 9th, two spots.

METEORS.

Visalia, California, 1st, 10th, 21st, 25th.
Wicklow, Dakota, 2d, 26th.
West Washington, District of Columbia, 8th.
Bethel, Connecticut, 10th.
Morrison, Illinois, 28th.
Davenport, Iowa, 8th, 23d.
Indianola, Iowa, 18th.
Clay Centre, Kansas, 9th.
Yates Centre, Kansas, 13th.
Woodstock, Maryland, 5th, 8th, 10th, 14th.
Boston, Massachusetts, 1st.
Cambridge, Massachusetts, 4th.
Charlestown, Massachusetts, 4th, 7th.
Rowe, Massachusetts, 3d, 8th.
Lansing, Michigan, 3d.
Swartz Creek, Michigan, 80th.
Brevard, North Carolina, 8th.
Stateburg, South Carolina, 18th, 19th.

The schooner "Jennie N. Huddell," at Hampton Roads, Virginia, observed a brilliant meteor at midnight of the 4th.

EARTHQUAKES.

San Francisco, California, 2d.—Two light shocks of earth-